

# **Linking the Delta to Sacramento River Ecological Flows**

**#0052**

# Technical Panel Review

*Proposal Name:* Linking the Delta to Sacramento River Ecological Flows

*Applicant Organization:* The Nature Conservancy of California

*Principal Lead Investigator(s):*  
Luster, Ryan

*Amount Requested:* \$697,397

## *TSP Panel Summary of Findings:*

This project is highly relevant to CALFED and the 2006 PSP. Sac-Delta EFT represents a potentially valuable management tool and is the clear next step for SacEFT. Further, TNC has the experience necessary to conduct the workshops and integration proposed. However, the hypothesis seems forced, and because they are proposing a largely adaptive process it is difficult to evaluate exactly what the research team will achieve. That is, given that models and focal species have not yet been identified, it is impossible to conclude whether or not they are appropriate. The proposal paints an optimistic view of what these models can predict. It may be problematic to obtain adequate 'functional relationships' linking fish populations to physio-chemical factors. This is especially true given that potential relationships appear to primarily involve linkages between physio-chemical variables and single species (no interacting ecological effects), and the fact that several potential stressors (e.g., contaminants, invasives) will likely not be considered. One external reviewer noted that the budget may be too small for such a lofty goal. It was also noted that TNC asked for a monetary extension on the first version of SacEFT, which calls into question the project proponents' ability to accurately predict the necessary budget for the proposed project. The panel expressed concern that, once complete, this project may be irrelevant because current CALFED efforts such as DRMS and DRERIP may have already concluded, and thus be unable to utilize the model in their products. The project proponent spent too much time describing the administrative and stakeholder outreach aspects of the

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project, and very little time explaining the technical merits of the project. The panel acknowledged that this project is relevant and is the logical next step in the current SacEFT effort, but that that effort may not be ready to move on to the next stage. The utility of the existing/forthcoming SacEFT could serve as a useful metric of the feasibility and overall value of the proposed work. A necessary precursor to getting more funding should be to discuss the data mined from the first phase and describe the success of the current/forthcoming product(including how managers will use this), which TNC did not do. The panel expressed concern about the feasibility of thoroughly involving stakeholders due to busy schedules. The panel recommended that the applicant re-apply after results from current SacEFT are final. This project may be more well-suited for an ERP directed action.

The panel had the following recommendations: - Make a direct recommendation about who the end-user of this product would be, and about its future relevance - Provide more specifics on the technical aspects of the project.

### *Relevance to PSP Topic Areas:*

High

### *TSP Technical Rating:*

Sufficient

### *TSP Funding Recommendation:*

Do Not Fund

### *TSP Amount Recommended: \$0*

### *Conditions:*

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*Proposal Title:* Linking the Delta to Sacramento River Ecological Flows

*Proposal Number:* 0052

*Proposal Applicant:* The Nature Conservancy of California

## Purpose

Comments	<p>ARE THE GOALS, OBJECTIVES AND HYPOTHESES CLEARLY STATED AND INTERNALLY CONSISTENT? The goals, objectives and hypotheses are clearly and transparently laid out on pages 3 and 4 of the proposal document. The entire proposal is carefully crafted around these objectives and constantly links back to these goals. The two hypotheses are nothing more than a rewording of the project goals into a testable format, but certainly comply with CALFED's request to make everything a testable hypothesis.</p> <p>IS THE IDEA TIMELY AND IMPORTANT? The application clearly articulates the crux of the problem CALFED and the larger environmental management community are facing: the lack of synthesis and explicit linkages of specific research across broader spatial scales.</p> <p>IS THE STUDY JUSTIFIED RELATIVE TO EXISTING KNOWLEDGE? The study is certainly justified relative to existing knowledge as it seeks to do what none of us have been able to do yet. That is, the applicants seek to 'bring it all together' under an al-singing all-dancing umbrella. With a bit of scepticism, I wish them luck.</p> <p>IS THE SELECTION OF RESEARCH, PILOT OR DEMONSTRATION PROJECT, OR A FULL-SCALE IMPLEMENTATION PROJECT JUSTIFIED? I would call this</p>
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a first attempt, or first phase of a full-scale implementation project. It is justified if one is happy with the outcomes of the SacEFT (grant @ ERP-02D-P61) project. The SacEFT project could be viewed as a pilot project for the current proposal. I was not familiar with this project until now. It appears promising and the first report (ESSA 2006, <http://www.watershedportal.org/Files/2920.pdf>) lays out a logical and seemingly robust framework. Reading between the lines, it does not sound like this project has yet delivered its major outputs (anticipated in Spring 2007). Thus, it is difficult to comment on just how successful this pilot project is.

ARE RESULTS LIKELY TO ADD TO THE BASE OF KNOWLEDGE? Whether the applicants do or do not successfully follow through on their goals and objectives, what is learned along the way towards trying to is arguably more important than the results that are spit out of their model.

IS THE PROJECT LIKELY TO GENERATE NOVEL INFORMATION, METHODOLOGY, OR APPROACHES? If successful the, project will generate a wealth of novel new information highlighting the complex interaction of biophysical processes with a largely human controlled plumbing system in terms of defined focal species. More important, if successful the methodology will be novel not in its inception but its implementation. There are at least 10 other research groups throughout the world striving towards similar modelling frameworks built on submodels derived from existing codes and datasets (e.g. Harmoni-IT: <http://www.harmonit.org/>). So in that sense, the methodology they propose is at the very least topical. We have yet to see any of these worthy efforts and projects actually fully operational and working. By fully operational, I include being fully integrated into the decision making process

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	and actually being adaptively managed. Thus, if the applicants manage to pull off their bit, the burden will be shared heavily by CALFED and the respective decision makers to put this into practice in a meaningful way.
<b>Rating</b>	Superior

### Background

<b>Comments</b>	<p>IS A CONCEPTUAL MODEL CLEARLY STATED IN THE PROPOSAL AND DOES IT EXPLAIN THE UNDERLYING BASIS FOR THE PROPOSED WORK? Yes. The conceptual model is clearly stated in section 2 (pages 4 through 7) and succinctly summarized in Figures 5, 6 and 9. It is worth noting that these conceptual models are not necessarily new, but instead suitably tailored adaptation of existing knowledge into the applicants own framework. This should be seen as a strength in terms of CALFED's call for making good use of 'existing information' that CALFED has largely footed the bill for. Moreover, these are conceptual models that the Delta Visioning Process (Mount et al. 2006) would call 'high consensus understandings ready for immediate application in decision making'. IS ALL OTHER INFORMATION NEEDED TO UNDERSTAND THE BASIS FOR THE PROPOSED WORK INCLUDED AND WELL DOCUMENTED? The applicants clearly did their homework. The application itself was a bit light on technical detail, but I think that was appropriate. They pointed their audience to ESSA (2006) to provide a bit more meat (which it did).</p>
<b>Rating</b>	Above Average

### Approach

<b>Comments</b>	<p>IS THE APPROACH WELL DESIGNED AND APPROPRIATE FOR MEETING THE OBJECTIVES OF THE PROJECT? While one might be able to criticize this application for being slightly slim on technical detail, one can not criticize the applicants for their study design or</p>
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management structure. The approach is heavily weighted on the synthesis of information and effective communication of that information with the correct (i.e. influential) people. From a strictly scientific research perspective, one might take issue with this. However, from a more pragmatic perspective of producing science that has some relevance and application for CALFED, this application has nailed it.

IS IT CLEAR WHO WILL BE PERFORMING MANAGEMENT TASKS AND ADMINISTRATION OF THE PROJECT AND ARE RESOURCES SET ASIDE TO DO SO? The application transparently lays out who is responsible for which tasks and

ARE PRODUCTS OF VALUE LIKELY FROM THE PROJECT? As stated above, the products out of this project are likely to be highly valuable in a practical context and potentially quite valuable in a scientific context.

IS THERE A PLAN FOR WIDESPREAD AND EFFECTIVE DISSEMINATION OF INFORMATION GAINED FROM THE PROJECT? Widespread and effective dissemination are integrated directly into the scope of work (pages 9-15). Specific provisions are included in: Task 1, Subtasks 3, 4, 5, 6, 7 and 8; Task 2, Subtask 2; Task 3, Subtask 1, 3 and 6. The optional components of Task 1, Subtask 6 and Task 3, Subtask 6, would be critical to enhancing widespread dissemination. I remain sceptical about the effectiveness of dissemination of too much technical information to lay audiences, but I am hopeful that it works.

ARE CONTRIBUTIONS TO LARGER DATA MANAGEMENT SYSTEMS RELEVANT AND CONSIDERED? Specific provision in the architecture of the modelling

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	framework for integration of existing large data sets and management and sharing of this data with the new outputs of their own models are called for in the proposal. Clearly, the experience from the SacEFT project is being built upon.
Rating	Above Average

### Feasibility

Comments	<p>IS THE APPROACH FULLY DOCUMENTED AND TECHNICALLY FEASIBLE? The approach is as fully documented as one can expect it to be in a proposal of this nature. Since I am grappling with similar issues, I would have personally liked to see more detail on the technical aspects of the models, the architecture of the modelling framework and how specifically they transparently communicate the uncertainties in the models. They frequently make reference to such issues in a generic matter that is hard to disagree with. However, the technical feasibility is very much left to good faith in ESSA's track record. Given the daunting scope of what the applicants are attempting to do, I think they may have underestimated how easy it will be to simply 'tack on a few Delta sub-models' to their SacEFT model to make a fully integrated system model. Details of just how they attempt to do this are elusive. I suspect that this is because they (like the rest of us) are still in the process of figuring out how to do this. Having put forth that criticism, I still think what they are trying to do could be supported just on its merits alone. Even if they don't fully succeed, this is probably a necessary stepping stone towards eventually getting there. It is certainly a refreshing departure away from the wealth of CALFED applications, which don't truly upscale.</p> <p>WHAT IS THE LIKELIHOOD OF SUCCESS? What the hell is success? If success is about discovery, then the likelihood of success from undertaking the process the applicants propose is extremely high. If success is</p>
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	<p>about precise accomplishment of each of the objective in some prescriptive, risk-adverse, audit happy sense, then I'd say these applicants have a good shot at being successful. This is the wrong question.</p> <p>IS THE SCALE OF THE PROJECT CONSISTENT WITH THE OBJECTIVES AND WITHIN THE GRASP OF AUTHORS? The applicant team have good track records in their respective fields and the proposal plays to each of their strengths. The proposed project is consistent with the scale of the objectives (something not common in the restoration business). For this the applicants should be commended for their astuteness. I don't know enough about the technical background of ESSA or the technical details of what they are doing to say if the scale of the project is realistically within their grasp under the modest confines of this proposal and budget. However, this should not be held against the applicants and does not mean the project is not worth funding.</p>
Rating	Above Average

## Budget

Comments	<p>IS IT CLEAR HOW MUCH EACH ASPECT OF THE PROPOSED WORK WILL COST INCLUDING EACH TASK, SALARIES, EQUIPMENT, ETC.?</p> <p>The budget is very clear and transparent. I have no issues with it.</p> <p>IS THE BUDGET REASONABLE AND ADEQUATE FOR THE WORK PROPOSED? If anything, I thought the budget was modest considering the scope of the project. The optional items they've flagged up (Task 1, Subtask 6 and Task 3, Subtask 6) have the potential to provide much greater benefit than their relatively minor financial savings they might provide. A point of clarification for Task 1, Subtask 6: While the software (GUI) would be made freely available, would the source code be made available too? Also, is there any provision for</p>
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	technical support for end-users?
Rating	Superior

## Relevance To CALFED

Comments	<p>HOW WELL DOES THE PROPOSAL ADDRESS THE PRIORITIES STATED IN THE PSP? The applicants have a clear understanding of CALFED politics and have cleverly crafted the proposal in direct recognition and integration with CALFED priorities stated in the PSP. Having previously reviewed 6 other CALFED proposals and having read a great deal more of CALFED proposals, these applicants do the best job I have seen of aligning the research that they want to continue doing to the aims and desires of CALFED. For many years CALFED has been a cash-cow for piecemeal projects that, while interesting in their own right, make rather insincere efforts to synthesize and integrate this information. These applicants astutely highlight this point without discrediting the science that has been done to date but then map out how they wish to attempt to start making broader linkages that can more usefully inform decision making at the system scale.</p> <p>DOES THE PROPOSAL CLEARLY AND DIRECTLY ADDRESS ONE OR MORE OF THE TOPICS IN THE PRIORITY RESEARCH TOPIC LIST?</p> <p>Yes, the project directly addresses Topic 1: Environmental Water.</p> <p>DOES THE PROPOSAL ADDRESS OTHER PRIORITIES STATED IN THE PSP SUCH AS INTEGRATION, SYNTHESSES, USE OF EXISTING INFORMATION, MULTIPLE DISCIPLINES OR MODELING? The application is fundamentally a synthesis and modelling exercise. The applicants make a point of focusing on integrating existing information from a plethora of disciplines and tying it together in a scenario modelling context. They term this 'gaming', which is a useful way of communicating to non techno-files and decision makers just what sort of</p>
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information these models can provide. Similar to Mount et al. (2006), the applicants seek to use this to clarify between science that is ready for practice versus science that can be pushed for cautious uptake in practice.

WILL THE INFORMATION ULTIMATELY BE USEFUL TO CALFED RESOURCE MANAGERS AND POLICY MAKERS? If they can successfully deliver the outcomes they are striving for, the information certainly has the potential to be useful to resource managers and policy makers. There are two primary dangers in the type of information that this project will produce. The first is that the 'games' or model outputs will either be confused by policy makers as reality or discredited as complicated and uncertain garbage. This is not the problem of the applicants, but rather a broader problem that we are all facing in the integration of scientific information into decision support tools. The second danger is that the outputs and operation of the model will be too complicated for resource managers and policy makers to understand. The reality is the systems in question are incredibly complex and interrelationships are not easily or appropriately reduced down to sound-bytes that everyone will understand. As such, I don't think that either of these dangers are reasons not to attempt what the applicants are doing or not to fund it. Rather, they should simply be recognized and dealt with.

I am sceptical that the political process will yield individuals who are bold enough to make the tough decisions that will ultimately follow. Similar to the on going climate change debates, we probably know enough already to make appropriate precautionary decisions. However, we don't have the political or societal will power to make the sacrifices that are required pro-actively. There is no mention in this application of the highly likely event that the Hayward fault goes, a catastrophic domino levee failure ensues. In that event, it does not matter how

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	many infinite water management scenarios you 'game' with in the upper Sacramento, the Delta will be dead (maybe not ecologically, but certainly as the water hub of the state).
Rating	Superior

## Qualifications

Comments	<p>WHAT IS THE TRACK RECORD OF AUTHORS IN TERMS OF PAST PERFORMANCE? The authors' track record is impressive.</p> <p>IS THE PROJECT TEAM QUALIFIED TO EFFICIENTLY AND EFFECTIVELY IMPLEMENT THE PROPOSED PROJECT? Within the context of the very minor reservations I mentioned in earlier sections, the project team does seem well placed to implement the proposed project.</p> <p>DO THEY HAVE AVAILABLE THE INFRASTRUCTURE AND OTHER ASPECTS OF SUPPORT NECESSARY TO ACCOMPLISH THE PROJECT? The project team is comprised of TNC and ESSA. TNC is well supported and connected to carry out the necessary management, networking, and ground-work aspects of this proposal. ESSA on the other hand has the experience and infrastructure to meet the technical demands of this proposal.</p>
Rating	Superior

## Overall Evaluation Summary Rating

Comments	This is a well written and carefully thought out proposal that builds off an existing CALFED project (grant # ERP-02D-P61). I do not know enough about the 'success' of that on-going project to judge how strong a foundation that provides to this application (but presumably one of the peer-reviewers will). Giving the applicants the benefit of the doubt, funding this
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project would increase the benefits of CALFED's previous investment in this project team, while at the same time truly striving towards the sort of holistic scientific agenda CALFED has been trying to push towards (but us scientists have been unable to deliver) for years. I don't think it matters whether or not this project team ticks every box they are aiming to on their deliverables list... the process of trying is surely to produce some valuable outcomes for CALFED. My impression is that these applicants are genuinely giving more than just lip service to CALFED's requests and if anyone has the technical capability to deliver, this team should. However, CALFED should reserve realistic expectations. This project's aspirations are admirable. This project's strategy to achieve those aspirations is robust. I am less concerned with whether they get there or not before the money from this project would run out. It is still worth funding.

As I do not have any major objections to this proposal, I will instead use this space to highlight a couple of finer, but fundamental, minutiae that arise in this application that both CALFED and the applicants may want to give some careful thought in the future to.

First, on page one in the second paragraph the applicants put forth, "A unifying thread among all these programs is the need for tools to help integrate the disparate information on the ecosystem effects of alternative management applications. While new information is being generated daily by ongoing research, adequate tools to synthesize, integrate and clearly communicate existing information have not kept pace." As a scientist who has devoted a fair chunk of time to making such 'tools', I have also subscribed to this thinking through my actions. However, is it really that we need more tools, or that we should just learn how to use the tools we've got? The socio-political uncertainties far out-weight the

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scientific uncertainties. There are a plethora of interesting, novel and rather uncomplimentary tools already available. Very analogous to all us consumers who buy loads of cheap power tools for woodworking from Home Depot, but still couldn't build a solid table that does not wobble if our lives depended on it; I think there is a danger in the current line of thinking that places so much confidence in the benefits that new technological tools will bring. There is too little emphasis on what it is we are really trying to build with these tools. There are lots of interesting specific questions to explore. Tools, like the ones the applicants are proposing are valuable for getting conceptual insight into the interactions of various management scenarios with natural physical and ecological processes. However, playing video games is not a substitute for making tough decisions. It might help inform the decisions (so we can blame it on the video game if we get it wrong), but it is not a substitute for the choices we already know we have to make.

The second point I would like to raise is a criticism of the unjustifiably optimistic way we frame environmental management goals, objectives and aims. The problem is that this optimism presupposes an outcome in a way that jeopardizes truly objective hypothesis testing. The applicants are not the first to do this, but I will use their goals as an example. On page 3, the applicants state first "Rather, we are seeking to develop a tool that can help identify flow management practices that best meet multiple species requirements within their evolved levels of resilience whilst satisfying human demands for water..." While it would be great if we could have everything, what evidence do we have to support that this is anything else other than pipe dream. As stated, this presumes that some balance could exist that would keep all the bugs and bunnies happy while allowing us humans to consume like we always have. It is just as likely that no such balance is possible. As such, this would not

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	<p>make the goal of developing a tool to test for this a waste of time. It is simply that the wording emphasizes a predetermined outcome that might foster unrealistic expectations.</p> <p>This is a good proposal. I would recommend funding it.</p>
Rating	Superior

# External Technical Review #2

**Proposal Title:** Linking the Delta to Sacramento River Ecological Flows

**Proposal Number:** 0052

**Proposal Applicant:** The Nature Conservancy of California

## Purpose

Comments	The goals and objectives of the proposed project are clearly stated and internally consistent. The proposed project would build upon existing progress in a previously funded ERP project (ERP-02D-P61) titled Implementing a Collaborative Approach to Quantifying Ecosystem Flow Regime Needs for the Sacramento River (SaceFT). The SaceFT is being implemented under a grant agreement for the period September 10, 2004 through September 9, 2007. The proposed project states that it was always envisioned that a future phase of the SaceFT would include the Delta region. This is a timely and important project because it addresses water management issues and scientific uncertainties in the Delta Region that could be used to aid in the recovery of listed fish species. This project would be developing a model, so it is appropriately a research/modeling effort. The proposed project has potential to contribute information on priority topics. The proposal is responsive to the PSP and also to recommendations that have made by the EWA Review Panel regarding the need have better integration among water management programs and use of models in decision-making processes.
Rating	Above Average

## Background

Comments	The proposed project is to develop a "relatively simple but robust and reliable decision support model to evaluate the relative ecological consequences of
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	<p>alternative water delivery projects (p. 6)." The proposal states that numerous studies and management tools exist to evaluate human-caused changes on individual ecological components, however, no single management tool exists that can integrate, analyze, and communicate ecological effects of water management in the Sacramento River and effects manifesting downstream in Delta. The proposal seeks to develop a tool that would simplify and integrate existing information, including data sets and models; it is also highly scalable, both in a temporal and a geographic sense. It cites examples of water management in the Delta including water quality standards, CVPIA (b)(2), AFRP, CALFED EWP and the EWA. The proposal states the EWA is the management tool that will benefit the most from this proposal. The current EWA program is only authorized through December 31, 2007 and there has been no decision whether to establish a Long-term EWA (LT EWA). An EIS/EIR for a LT EWA is currently under development however, we can't know whether the preferred alternative will be selected or how the EWA program would operate. It could potentially change from a water purchase based program. The EWP is another program that hasn't been implemented as it was conceived in the CALFD ROD and its future is also uncertain. So in summary, the benefits of the proposed project will likely be diminished if the EWA and EWP come to an end. There is no explicit conceptual model stated; one can only be inferred from the text and be that as it may, it is untestable.</p>
<b>Rating</b>	Sufficient

### Approach

<b>Comments</b>	<p>The approach described in the proposal is to rely to a great extent on exiting models, data sets, and studies of key biophysical relationships that could be integrated into a Delta module which would become integrated with the SacEFT, becoming the Sac-DeltaEFT. The proposal describes tasks related to public</p>
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	<p>outreach and stakeholder meetings which should yield valuable input. Task management and administration is described and appears reasonable and the resources should be sufficient to conduct the work. There is however, in this reviewer's professional opinion, great uncertainty whether some of the key objectives could be accomplished and therefore would diminish the value of the SacDeltaEFT, particularly describing functional biophysical relationships for delta smelt (e.g. flow requirements) and other focal species in the Delta, which is an extremely complex and dynamic ecosystem with a great deal of scientific uncertainty. It also seems that a significant shortcoming of the proposal is that it will be trying to predict/explain species' responses to water management based largely on flow relationships. While flow is no doubt important, the POD work also looks at water quality, contaminants, and community ecology (food web, invasive species, etc.). Leaving these factors out of any model of Delta species is problematic. The data sets and models that are proposed to be integrated are valid however the challenge would be to describe robust relationships between these data such that a predictive model could be developed for the Delta. It is also not explained how the project would be coordinated with agency-lead activities (described on p. 10) such as the DRERIP, BDCP and Delta Vision Process, which are purported to derive significant value from this effort and which are also involved in a scientific efforts, including the development of conceptual models of ecosystem processes and species life histories and examining various management actions and scenarios for the Delta. The DRMS, DRERIP and the BDCP will be nearly completed before the Sac-DeltaEFT, therefore it is not convincing that this project will add value to this other activities.</p>
Rating	Inadequate

## Feasibility

Comments	<p>The proposed approach is to “utilize a collaborative workshop process and a decision analysis tool to formulate linkages between the flow regime and ecosystem components both within the mainstem of the Sacramento River and the Delta. In the same way as the background information above describes for the Sacramento River system, this proposal seeks to extend SacEFT to include biological components of the Delta ecosystem (e.g., at-risk pelagic organism decline species) and their relationships with water quality (e.g., temperature, salinity), and CBDA activities (e.g., change in timing and magnitude of water exports) to better illuminate and communicate ecological implications of system-wide operations. Similar to the case for the current Sacramento River effort, there are a number of potential models, data sets, and studies of key biophysical relationships that could be integrated into a Delta extension of SacEFT.” It is further stated that “This information will aid in the recovery and restoration of many at-risk aquatic, POD (pelagic organism decline), and riparian species and habitats, facilitating the most promising water management and ecosystem restoration strategies for the Study Area”. As stated above in the “Approach” section, there are some uncertainties associated with the feasibility of accomplishing some of the key objectives of this proposal (e.g. describing flow relationships with focal species) and how the tasks would be coordinated with the agencies. The proposal also states it will draw extensively off the existing SacEFT. It is uncertain how applicable some of this work will be applicable to the Delta. For example, on p. 15 it states that flows-species response linkages to Chinook salmon could be easily built upon and included in the Sac-DeltaEFT.</p>
Rating	Inadequate

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### Budget

Comments	For a proposal that is drawing extensively off the existing work that will be accomplished through the SacEFT, the proposed budget seems like a lot of money. The SacEFT recently received a contract amendment of over \$70,000 to pay for unexpected delays in completing certain tasks. According to the GCAP Contract Manager's notes from the ERP Amendment Request Workshop, additional funds were requested because of the complexity involved in compiling, reviewing and refining the State of the System Report and the staged development of the Linked Decision Analysis Model, and completion of SOS Report. This does not bode well for SacDelta EFT proposal. I have concerns whether the proposed budget is an accurate reflection of what it will take to accomplish the tasks and whether the project proponents will be coming back to the ERP Amendments Subcommittee at a future date requesting more money to finish the job.
Rating	Sufficient

### Relevance To CALFED

Comments	As state in the Purpose section above, the proposal is responsive to the PSP and also to recommendations that have made by the EWA Review Panel regarding the need have better integration among water management programs and use of models in decision-making processes. It is also addressing topics that are of concern to CALFED, e.g. the recovery and restoration of Delta at-risk aquatic species and understanding factors leading to the pelagic organism decline POD. The proposal involves a great deal of data integration, synthesis, and modeling. It is not clear, however, how useful the product will be to CALFED resource managers and the policy makers for the reasons described in the "Approach"
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## External Technical Review #2

	section above.
<b>Rating</b>	Sufficient

### Qualifications

<b>Comments</b>	The project team appears well qualified. There have been issues related to past performance of subcontractors meeting schedules and completing deliverables.
<b>Rating</b>	Sufficient

### Overall Evaluation Summary Rating

<b>Comments</b>	While the proposal is addressing very important management objectives of the agencies, there is some doubt whether key objectives are attainable, whether the proposal was considering all of the important ecological factors in the Delta, how coordination with the agencies would occur, and whether the Sac-Delta EFT would be a tool used by the agencies and decision-makers.
<b>Rating</b>	Inadequate

# External Technical Review #3

*Proposal Title:* Linking the Delta to Sacramento River Ecological Flows

*Proposal Number:* 0052

*Proposal Applicant:* The Nature Conservancy of California

## Purpose

Comments	If completed as proposed, this work would be of great value to resource managers. A decision analysis tool for water management alternatives that incorporates the vast amount of existing data is a fabulous idea (probably why CALFED funded the original Flows Project work that this proposal seeks to build upon). If successful, the tool could be invaluable for those trying to understand ecological trade-offs associated with water management alternatives. Goals and objectives are clearly stated. The hypotheses are somewhat inadequate (e.g. the proposal involves developing a decision analysis tool, and one hypothesis was "it is possible to create a decision support tool..."). The proposal does not state how hypotheses will be tested. The work will not be novel (as it builds upon work currently being done for the Sacramento River), but it will expand current work to a larger area (including the Delta).
Rating	Above Average

## Background

Comments	The conceptual model is not clearly stated in the text. However after reading the entire proposal and finding the figures at the end (many not mentioned in the text) the conceptual model was clearer. The underlying basis was clear and well documented for the continued work expanding the Sacramento River Flows Project to include the Delta.
Rating	

### External Technical Review #3

	Sufficient
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## Approach

Comments	<p>The authors have already begun a similar project for the Sacramento River. The approach follows the Sac-EFT design and is merely an expansion of the original project to include the Delta as well. It is not clear who will be performing all the tasks, but resources are set aside to do so in the TNC detailed budget (see budget section for explanation). Additionally, the role of some of the people involved is not clearly stated, such as Anthony Saracino, his references are listed but his role is not discussed. Generated products would be of great value. Specifically, the decision analysis tool could be a boon to water resource managers who are faced with making decisions, often in the absence of such sophisticated tools that help synthesize vast amounts of data. Widespread dissemination would be improved by the authors desire to create a weblink (although this part of the project was noted as "optional") with a user-friendly interface so that more people could access the decision analysis tool (also "optional" to make the software accessible to non-technically savvy users).</p>
Rating	Sufficient

## Feasibility

Comments	<p>The approach is mostly documented. Developing the decision analysis model is feasible, as the model does not seek to be predictive but rather to compare alternatives and evaluate uncertainties. Previous work on the Okanagan Fish/Water Management Tool indicates that those involved in the project can accomplish the task successfully.</p>
Rating	Above Average

### External Technical Review #3

## Budget

Comments	There are portions of the budget that are unclear. Money for ESSA technologies subcontractor is not detailed (totals over \$365,000). Apparently that is the cost of facilitating workshops, developing the analysis tool as well as software, as these are indicated in the text as their responsibilities. However, that seems to be the bulk of the work as detailed in the proposal, which makes it difficult to understand why the rest of the project will cost \$332,000. There are 10 personnel listed for Nature Conservancy in the budget, but only four are mentioned in the proposal. It is not stated why these extra personnel would be needed. However, comparing with the money recieved for previous work, the budget seems reasonable.
Rating	Sufficient

## Relevance To CALFED

Comments	The proposal specifically addresses the Environmental Water Priority Topic stated in the PSP. It would also be an interdisciplinary project that analyses and uses existing data to create a decision analysis tool. If completed and used successfully, the decision analysis tool could be extremely helpful to water managers, such as those involved with the Environmental Water Account or CVPIA.
Rating	Superior



## Qualifications

Comments	Those involved in the project are qualified to do the work, but have not published results from similarly complex work in peer-reviewed journals (rather most work has been in technical reports). However, the Okanagan Fish/Water Management Tool was successfully completed by the ESSA team and is currently in use. It would be helpful to know if the Sac-EFT was completed successfully, but that project is not due to be completed until Spring of 2007. Adding the Delta to the decision management tool would make the modeling more complex, but those involved have the infrastructure and support necessary to complete the project, especially if the Sac-EFT is completed successfully.
Rating	Above Average

## Overall Evaluation Summary Rating

Comments	Overall this project seems possible, important and the team seems sufficiently capable of creating the products based on their past experience. While the written proposal was slightly vague and difficult to follow, the decision management tool produced could be of great value to water managers. Two main criticisms of the proposal come to mind involving the complexity of the system and uncertainty. The authors failed to describe in detail how the model would account for complexity in the system. Specifically, the proposal states that there will be no calibration of modeling (using only existing models). Although omitting calibration would be a cost saving measure, it is unclear whether this is well thought out giving the complexity of the system. Additionally, the proposal could have explained in more detail how the decision analysis tool will represent the vast uncertainties in the Delta. As noted in the text, considering
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	<p>uncertainty will be extremely important to the success of this model. Several authors have published on various aspects of decision-making with uncertainties, specifically relating to sensitivity analysis and conservation decision-making. It may be that the authors are aware of the emerging use of Bayesian statistics and have decided for various reasons to use sensitivity analysis, but it would have improved the proposal if authors had included more information and discussion on this critical topic. My above average rating is based on the utility of the decision analysis tool if completed successfully and the qualifications of those involved that indicate the tool could be feasibly created.</p>
<b>Rating</b>	Above Average